AMENDMENTS TO THE CLAIMS

Please cancel claims 20, 29 and 30, amend claims 1-19, 21, 23, 26, 31, 33, 35, 38, 40 and 41, and add new claims 42-49, such that the status of the claims 1-19, 21-28 and 31-49 is as follows:

1. (Currently Amended) A ~~structure~~ visual display to interact with electromagnetic waves by changing optical aspect in selected areas in response to an external signal, the ~~structure~~ visual display comprising:

a plurality of optically anisotropic responsive elements, wherein the responsive elements are optically anisotropic pertaining to a visible light, each responsive element capable of presenting at least two different optical aspects and changing between the optical aspects based on an applied external signal;

a support substrate containing the responsive elements, the support substrate having a surface structure which ~~define~~ defines receiving positions for the responsive elements; and

an array of transparent lenses, at least a part of each lens being in direct contact with a receiving position on the surface structure of the support substrate such that the receiving position at least in part inherently defines the lens shape and location.

2. (Currently Amended) The ~~structure~~ visual display of claim 1, wherein ~~the structure is a visual display and the responsive elements are optically anisotropic pertaining to a visible light~~ the support substrate has two major sides, one major side being opaque.

3. (Currently Amended) The ~~structure~~ visual display of claim 1, wherein the external signal is an electromagnetic field.

4. (Currently Amended) The ~~structure~~ visual display of claim 1, wherein the responsive elements are rotating particles.

5. (Currently Amended) The ~~structure~~ visual display of claim 4, wherein the particles are spheroid balls.

6. (Currently Amended) The ~~structure~~ visual display of claim 1 wherein support substrate is three-dimensionally micro fabricated.

7. (Currently Amended) The ~~structure~~ visual display according to claim 1, wherein each lens is a converging lens.

a1 cont

8. (Currently Amended) The ~~structure~~ visual display of claim 7, wherein:

each lens has a focal length and each responsive element has a portion imparting a visual aspect, the portion being substantially positioned within the focal length from the associated lens.

9. (Currently Amended) The ~~structure~~ visual display according to claim 1, wherein:

each lens has a perimeter edge, the edge being in direct contact with the top perimeter edge of the associated receiving position.

10. (Currently Amended) The ~~structure~~ visual display according to claim 1, wherein:

the lens array is formed using a lens-forming film laid across the substrate after the responsive elements are placed into the support substrate.

11. (Currently Amended) The ~~structure~~ visual display according to claim 10, wherein the lens-forming film fluidly directly seals the responsive elements within the substrate.

12. (Currently Amended) The ~~structure~~ visual display of claim ~~2~~ 1, wherein each lens enlarges image of at least a portion of the responsive element or elements positioned below the lens by refracting the light reflected therefrom.

18 ~~13~~. (Re-presented – formerly dependent claim #13) A structure to interact with electromagnetic waves by changing optical aspect in selected areas in response to an external signal, the structure comprising:

a plurality of optically anisotropic responsive elements, each responsive element capable of presenting at least two different optical aspects and changing between the optical aspects based on an applied external signal;

a support substrate containing the responsive elements, the support substrate having a surface structure which define receiving positions for the responsive elements; and

an array of transparent lenses, at least a part of each lens being in direct contact with a receiving position on the surface structure of the support substrate such that the receiving position at least in part inherently defines the lens shape and location,

~~The structure of claim 1,~~ wherein the support substrate has two major sides, one major side being opaque.

all cmt

19 ~~14~~. (Currently Amended) The structure of ~~clam~~ claim ~~13~~ 18, wherein the opaque side ~~to~~ of the support substrate comprises an opaque cover plate bonded to the rest of the support the substrate.

13 ~~15~~. (Currently Amended) The ~~structure~~ visual display of claim 1, wherein each receiving position contains only one responsive element.

14 ~~16~~. (Currently Amended) The ~~structure~~ visual display of claim 1, further comprising a filler material at least partially surrounding each particle.

15 17. (Currently Amended) The ~~structure~~ visual display of claim 14 16, wherein:

the filler material exerts a force on the particles, the force being sufficient to keep the particles bistable but not excessive as to prevent the particles from a rotating upon the application of the electromagnetic field.

16 18. (Currently Amended) The ~~structure~~ visual display of claim ~~2~~ 1, further comprising a top cover laid across the supporting structure and the responsive element contained therein, the top cover being transparent and non-reflective.

A1 cont 20 19. (Currently Amended) A display which can communicate visual information by changing color in selected areas responsive to an electromagnetic field, the display comprising:

a plurality of chromatic display particles being visible on the surface of the display, each display particle capable of presenting at least two different optical aspects and changing between the optical aspects based on an applied electromagnetic field, and being optically reflective and substantially non-transmissive in each of the two optical aspects;

a support substrate containing the chromatic display particles, the support substrate having a surface structure which defines receiving positions for the particles; and

an array of transparent lenses displaced parallel to the support substrate, with each lens corresponding to one receiving position and at least one particle, wherein the lens, the receiving position and the particle or particles in correspondence with lens together define a display unit;

wherein the support substrate has two major sides, one major side being opaque.

20. (Canceled) ~~The display of claim 19, wherein the support substrate has two major sides, one major side being opaque.~~

27 ~~21~~. (Currently Amended) The display of ~~claim 20~~ claim 26, wherein the opaque side of the support substrate comprises an opaque cover plate bonded to the rest of the support the substrate.

28 ~~22~~. (Original) The display of claim 26, further comprising a filler material at least partially surrounding each particle.

a1 cnt ~~23~~. (Re-presented – formerly dependent claim #23) A display which can communicate visual information by changing color in selected areas responsive to an electromagnetic field, the display comprising:

a plurality of chromatic display particles being visible on the surface of the display, each display particle capable of presenting at least two different optical aspects and changing between the optical aspects based on an applied electromagnetic field, and being optically reflective and substantially non-transmissive in each of the two optical aspects;

a support substrate containing the chromatic display particles, the support substrate having a surface structure which defines receiving positions for the particles;

an array of transparent lenses displaced parallel to the support substrate, with each lens corresponding to one receiving position and at least one particle, wherein the lens, the receiving position and the particle or particles in correspondence with lens together define a display unit; and

a filler material at least partially surrounding each particle;

~~The display of claim 19,~~ wherein:

the filler material exerts a force on the particles, the force being sufficient to keep the particles bistable but not excessive as to prevent the particles from rotating upon the application of the electromagnetic field.

29 ~~24~~. (Original) The display of claim ~~19~~ 25, wherein:

the chromatic display particles have a particle size, and the receiving positions have a first viewing aperture which is smaller than the particle size.

30 ~~25~~. (Original) The display of claim ~~24~~ 25, wherein each lens defines a second viewing aperture which is greater than the first viewing aperture.

A1 CMT

33 ~~26~~. (Currently Amended) A method of making a structure to interact with electromagnetic waves, the method comprising:

making a substrate, the substrate having a plurality of cavities;

placing a plurality of responsive elements in the cavities, wherein the responsive elements are rotating particles, and when placed in the cavities, each responsive element ~~being~~ is optically anisotropic with respect to an electromagnetic wave, with each responsive element capable of presenting at least two different optical aspects and changing between the optical aspects based on an external signal; ~~and~~

forming an array of optical lenses directly on the substrate, each optical lens being connected to a said cavity; and

adding a filler material into each cavity, the filler material being selected and positioned so that the filler material exerts a force on the particles, the force being sufficient to keep the particles bistable but not excessive as to prevent the particles from a rotating upon the application of the electromagnetic field.

34 ~~27~~. (Original) The method of claim ~~26~~ 33, wherein the structure is a visual display and the responsive elements are optically anisotropic with respect to a visible light.

35 ~~28~~. (Original) The method of claim ~~26~~ 33, wherein the external signal is an electromagnetic field.

29. (Canceled) ~~The method of claim 26, wherein the display elements are rotating particles.~~

30. (Canceled) ~~The method according to claim 29, further comprising:~~

~~adding a filler material into each cavity, the filler material being selected and positioned so that the filler material exerts a force on the particles, the force being sufficient to keep the particles bistable but not excessive as to prevent the particles from a rotating upon the application of the electromagnetic field.~~

A1 cont

36 ~~31~~. (Currently Amended) The method of claim ~~26~~ 33 wherein ~~support~~ the substrate is three-dimensionally micro fabricated.

37 ~~32~~. (Original) The method claim 26, wherein each lens is a converging lens.

38 ~~33~~. (Currently Amended) The method of claim ~~25~~ 26 33, wherein each optical lens enlarges an image from at least a portion of the visible side of a said display element associated with the optical lens.

39 ~~34~~. (Original) The method of claim ~~26~~ 33, wherein the step of forming an array of lenses comprises:

placing a top layer over the cavities, the top layer comprising a lens-forming layer; and

forming an array of lenses from the lens-forming layer.

40 ~~35~~. (Currently Amended) A method of making a visual display apparatus, the method comprising:

making a substrate, the substrate having a plurality of cavities;

placing a plurality of optically anisotropic display elements in the cavities, and when placed in the cavities, each display element having a visible side, each display element capable of presenting at least two different optical aspects and changing between the optical aspects based on an external signal;

~~adding~~ directly forming an array of optical lenses on the substrate, each optical lens being individually connected to a display unit, each optical lens further enlarging an image from at least a portion of the visible side of each element belong to the corresponding display unit; and

making the visual display apparatus optically non-transmissive.

41 ~~36~~. (Original) The method of claim ~~35~~ 40, wherein the display elements are rotating particles.

42 ~~37~~. (Original) The method of claim ~~35~~ 40, wherein the particles are spheroid balls.

43 ~~38~~. (Currently Amended) The method of claim ~~35~~ 40 wherein ~~support~~ the substrate is three-dimensionally micro fabricated.

44 ~~39~~. (Original) The method claim ~~35~~ 40, wherein each lens is a converging lens.

45 ~~40~~. (Currently Amended) The method of claim ~~35~~ 40, wherein:

~~adding an optical lens on the substrate comprises directly forming the optical lens on the substrate.~~

making the visual display apparatus optically non-transmissive comprises adding an opaque bottom layer or plate to a side of the substrate.

46 ~~41~~. (Re-presented -- formerly dependent claim #41) A method of making a visual display apparatus, the method comprising:

making a substrate, the substrate having a plurality of cavities;

placing a plurality of optically anisotropic display elements in the cavities, and when placed in the cavities, each display element having a visible side, each display element capable of presenting at least two different optical aspects and changing between the optical aspects based on an external signal;

adding an array of optical lenses on the substrate, each optical lens being individually connected to a display unit, each optical lens further enlarging an image from at least a portion of the visible side of each element belong to the corresponding display unit; and

~~The method of claim 35, wherein:~~

~~making the visual display apparatus optically non-transmissive comprises~~ adding an opaque bottom layer or plate to a side of the substrate to make the visual display apparatus optically non-transmissive.

17 ~~42~~. (New) The visual display of claim 1, wherein the opaque side of the support substrate comprises an opaque cover plate bonded to the rest of the support the substrate.

20 ~~43~~. (New) The structure of claim 18 ~~13~~, wherein the responsive elements are rotating particles.

21 ~~44~~. (New) The structure according to claim 18 ~~13~~, wherein each lens is a converging lens.

22 ~~45~~. (New) The structure of claim 21 ~~44~~, wherein:

each lens has a focal length and each responsive element has a portion imparting a visual aspect, the portion being substantially positioned within the focal length from the associated lens.

23 ~~46~~. (New) The structure according to claim 18 ~~13~~, wherein:

each lens has a perimeter edge, the edge being in direct contact with the top perimeter edge of the associated receiving position.

34 ~~47~~. (New) The structure according to claim ~~13~~ 18, wherein:
the lens array is formed using a lens-forming film laid across the substrate after the responsive elements are placed into the support substrate.

AM cancel 25 ~~48~~. (New) The structure of claim ~~13~~ 18, wherein each lens enlarges image of at least a portion of the responsive element or elements positioned below the lens by refracting the light reflected therefrom.

31 ~~49~~. (New) The display of claim ~~22~~ 28, wherein the filler material exerts a force on the particles, the force being sufficient to keep the particles bistable but not excessive as to prevent the particles from rotating upon the application of the electromagnetic field.